Abstract: The course engages the contemporary issues of urban ecology and its articulation to design in urban settings. The new commitment of the co-habitation of nature and built environment has drawn attentions of city planners, urban designers and architects. The discourses of urban sustainability have to move away from social sufficiency, ecological efficiency to systems compatibility by linking the urban forms and ecological flows in urban, industrial and natural systems. The climate challenges require design and planning professionals to deal with how cities could be analyzed, designed, managed, evaluated, represented and changed to meet the goals of shaping ecological, sustainable and resilient urban future.

Defined by two categories Forms and Flows, the course covers theories, methods, tools and case studies of ecologically sound urban systems design. The first session Theory and Method introduces foundational theories in urban design, urban ecology, ecological design, and engages contemporary debates in urban sustainability and ecological urbanism. The second session Forms: Landscape and Urban Structure deals with landscape ecological structure, ecological effects of mega cities, sustainable urban form, waterfront revitalization, the debates of landscape urbanism, downtown urban environment and the proposition of organized complexity in cities. The third session Flows: Urban Metabolism covers theories and issues that address the concept of urban metabolism: how energy, material, water, informational flows and human movement in cities are structured and designed. The course concludes with a synthesis of design method for ecological urban systems, in which urban design is seen as an ecological intervention and modeling tools for synthesizing complex system issues. Students are expected to participate in lecture series, tutorials and seminars actively. The course this year has a special focus on smart city design. By selecting one specific theme under the course framework, students will participate in research teamwork and work on individual term paper over the semester.

Course Schedule

PART I - Theory and Method
1. 1/13 Introduction: Urban design, urban ecology and ecological design
2. 1/20 Urban sustainability, ecological urbanism and smart city movement
   Ecological city-regions in global context

PART II - Forms: Landscape and Urban Structure
3. 1/27 Landscape ecological flow: design for ecologically sound landscape patterns
4. 2/03 Urban-nature edges and landscape urbanism
   Global waterfront design and redevelopment
5. 2/10 Downtown urban environment and organized complexity

PART III: Flows: Urban Metabolism
6. 2/17 Informational flow: urban modeling and Geodesign (with Steven Quan)
7. 2/24 Energy flow and urban form (Steven Quan)
8. 3/03 Seminar: 1) density and urban form; 2) energy, urban form and design
9. 3/10 Seminar: 3) water-energy-food nexus in urban design; 4) eco city performance metrics
10. 3/17 Urban ecosystems (Marc Weissburg)
11. 3/24 Spring Break
12. 3/31 Design for urban metabolism (dialogue with Marc Weissburg)
13. 4/07 Students’ project presentation (1)
14. 4/14 Students’ project presentation (2)
15. 4/21 A synthesis: urban systems design for smart cities